# The Politics of Global Climate Change
(Transcript)

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I am delighted to be here at Yale with a lot of friends and with the chance to talk about the issue of climate change in a room filled with students and some of the most experienced people in the world on this issue. So, I'm not going to talk about the number of kilojoules per mole because Klaus [Lackner] will hold that end of our bargain at the Earth Institute but I will talk a little bit about the politics of this, seeing many of the people who are immersed in the politics in front of me.

On the one side, this as complex an issue as one could possibly get from a public policy point of view because it is global. It is long term. It is filled with profound uncertainties of every sort. It is filled with impacts that are highly differentiated in different parts of the world, involving the independent actions of a vast range of sectors and participants.

And so, on the one hand, even though this has been at the center of discussion for a couple of decades at least, it's not surprising that we still have a ways to go before we arrive at a political strategy that is really going to seriously address the issue. I don't think Kyoto is doing that at this moment: it covers much too small a part of the world and is much too short term to be anything more than a very difficult first step.

But, as I was pondering this in the traffic jam on the way here, I think we're going to reach a consensus much faster than we think. I think we're building towards real action on climate change at a global scale that will come surprisingly quickly. I don't know if it's going to be next year or the year after or the year after, but some time in the next few years I think we're going to have a dramatic political change on this subject that will mean several things: first, engagement of the United States; second, and very importantly, engagement of China, India, and the developing world on this topic; third, engagement beyond 2012. But really we'll start to face this issue as it needs to be faced, over several decades rather than over the next few years. That will be a quite dramatic improvement over the current situation, and I think it's going to come.

Why? Because possibly in the end this is going to look a lot more like the ozone issue than it does right now. And I see Scott here who's written very persuasively about why we were able to get a quick settlement on ozone -- surprisingly quick and surprisingly effective. And the reason is that there came a moment when three things happened.

First there was a scientific consensus on major points. Second, there was a public appreciation of the issue that suddenly emerged with pictures of the ozone hole. And, third, there was a technological approach that suddenly became viable so that some of the major players, in particular some of the major CFC producers, offered an alternative.

When those pieces came together, what would look in theory like a very hard thing to do -– reaching a global agreement on a complex scientific issue for the long term -- suddenly happened. And although it is not everything one might want, it is not bad at all from the point of view of getting our strange species, at a scale of 6.5 billion in over 191 countries, to agree on anything and to accomplish it. Perhaps climate change will be perceived similarly the more people look at it.

What is happening now is that there is quite a strong scientific consensus emerging. And despite several attacks on that consensus, it has not only proved resilient, but much more important, the facts have been coming continuously in support of the consensus.

The Intergovernmental Panel on Climate Change (IPCC), which is so ably led by Dr. R.K. Pachauri, has proved to be -- despite huge political assaults -- a scientific enterprise of great integrity and very high quality that has commanded worldwide respect and that has been able to show that there is an underlying consensus among the vast majority of climate scientists, ecologists, and among economists with an interest in this question, much shared understanding of the basic economics of what's at stake.

And so, I think the first of these conditions is nearly at hand. Now, there are huge uncertainties in all of climate science. There's no doubt about it. And the most vigorous proponents of action on climate change tend to be the most vigorous proponents of the huge range of uncertainty that we face.

So, there is no claim among the ‘do-something’ community that says we know exactly what's going to happen – in fact it is almost exactly the opposite. One of the big claims of the ‘do-something’ community is that we don't know exactly what's going to happen. We know how non-linear responses have been in the paleoclimate and how much uncertainty there is right now, and we know we're making a gamble on a global scale, so we should really be doing much more given what’s at stake.

If it were just a local scale gamble, I think there would be a lot more reticence. But with a global scale gamble I think it's a very different point, and I think there's strong and growing scientific consensus that we do not want a three time carbon world. And we're certainly on track for that. We probably really do not want to get to a two time carbon world. We might not even like the one that we've already set in motion, which is considerably less than a two time carbon world, but already seems to be having its effects.

I think the second point that leads me to think that there is a growing chance of a breakthrough on this issue is that we're approaching something like the famous satellite picture of the hole in the ozone, and that's Hurricane Katrina in the United States. Of course we can't prove it occurred because of climate change, but we can show with increasing confidence that the intensity, frequency and power dissipation of high severity hurricanes is on the rise. And Katrina was one of those high intensity, high duration hurricanes, and so was Hurricane Wilma, which is bearing down on Florida right now. This is changing American politics dramatically and very rapidly, I am absolutely convinced.

... governor of Mississippi, and was sitting right next to him carrying on about climate change and about the risks to Mississippi. That has to be a sobering thing for the politicians of the Gulf region, whether they're Republicans or Democrats. They tend to be Republican in a large swath of that region, and they have to be noticing these hurricanes barreling in on them.

Now, if the climate scientists are wrong and this was all truly an anomaly, then what I am describing will go away. But if they are right -- and as a consumer of this literature I bet that they are -- then it is not going away. What I wish to emphasize is that climate change is not just coming, it is already here. And this is a major difference from how the discussion was framed even five or ten years ago.

The big literature now is on attribution of current changes, not on speculation about future changes. Many attribution studies are being published, asking whether the recent hurricanes are the result of climate change; whether the European heat wave of 2003 was the result of climate change -– the answer in that specific episode was, overwhelmingly, that climate change most likely was responsible -- whether drought occurrences which are very pervasive and seemingly abnormal in many places are the result of climate change; whether the change in the African environment, say the 25 year decline of precipitation in parts of southeastern Africa and parts of the Sahel can be attributed to long term climate change. A lot of these studies are finding that it is highly probable that climate change is at work.

This is changing the politics a lot; people will not be happy to see their climate change this way. Change is going to be very difficult to handle many people and many types of change. We are going to be arguing less and less about

the hypotheticals and seeing the impacts more and more instead. As we start to wonder what path we are on, I think we're going to have that hole in the ozone epiphany, and maybe it's already happening in this country with the political change. That's number two.

The third thing that happened in the CFC debate was that the problem was resolved not really because we found out how dangerous it was, but because somebody, in this case the producer, came up with a good solution. That changed everything because the costs of inaction were becoming more and more vivid, but then suddenly the costs of action didn't look so large.

In this debate, the third thing that's been happening in the last couple of years is that rank amateurs on these issues like me are learning about power plants, about sequestration, and about alternative energy sources. The whole buzz is about technology, which is great. It's a lot better than the buzz being about the shape of supply and demand curves. Of course they're our analytical instrument, but they will never carry the day. What will carry the day is that we have an affordable alternative to CFCs, or that carbon capture and sequestration truly can be done for one cent per kilowatt hour, or that hybrid plug in technology can be cost-effective. As we get to more of the specifics and if the specifics are right, we will get action. If the specifics tell us that there really is no cheap fix, then what I'm saying is wrong. But I think we're getting to a point where people are looking more and more at the specifics.

We at the Earth Institute, in significant part thanks to Klaus Lackner's long term commitment to this issue, are focusing on the specific idea that we can have fossil fuels and use them safely through carbon management. The predominant feasible technology in the shorter term, it seems, is carbon capture at large scale fossil fuel users, especially power plants but also refineries and industrial facilities. The idea is to capture the carbon dioxide exhaust, put it into a pipeline and store it in an appropriate geological deposit, an oil or gas field or a saline aquifer or some other geological deposit that has a good chance of holding onto the carbon dioxide.

The good news about that according to the latest finding summarized by the IPCC is that the pure costs of doing that, with each step already known under current technology, are really quite modest, maybe one to two cents per kilowatt hour. We already know al lot about how you take the carbon dioxide out of a plant, especially one designed for this purpose, such as an integrated gasification, combined cycle, thermal plant. We know very well how to put it in a pipeline, because we're doing a lot of that already. Shipping $CO_2$ by pipeline is not difficult, and we also know the costs of sending it down into an aquifer. What is not known, I think, is whether the carbon dioxide stays there. That is a major question for the geologists to answer.

The good news is that the IPCC claims in this report that it is 'very likely,' which means 99 percent, if I remember correctly, that there is ample storage space for carbon around the world. Furthermore, the storage is close enough to existing coal deposits to make feasible the use of coal and the storage of the resulting carbon dioxide in saline aquifers and other geologic deposits.

It's difficult to know if those findings are correct because there is only one field working this way by design, the Sleipner field, and although there is secondary recovery using carbon dioxide, not much attention is being paid to how much $CO_2$ stays down and we do not know enough about the overall geology of where this can be done and how safe it is. But if it proves to be feasible, it is a tremendous breakthrough, since it puts a reasonable cap on the costs of carbon capture and sequestration.

We've estimated that if we did this on a mass basis for power plants all over the world and we scaled it up to the year 2050 for all fossil fuel plants, we might be talking about $100 to $200 billion a year of extra cost or maybe even $200 to $300 billion a year. But keep in mind that those costs would be in a world economy worth around $250 trillion by 2050. Those two estimates rise or fall somewhat in proportion, because each one depends on estimates of overall future economic growth, and therefore on overall future demand for new electricity generating power plants.

There are obviously a lot of other technological possibilities that are in sight right now, and the other one that is most dramatic, of course, is already in widespread use and has improved efficiency of vehicles through existing hybrid technology, with no social costs at current oil prices. Hybrid technology is a net saving, assuming oil prices remain roughly above $60 a barrel: the extra costs of hybrid vehicle construction, the battery costs, and the other costs are outweighed by the energy saving. With hybrid technology there would be absolutely no cost to improved fuel efficiency, and one would expect that a tremendous market response. Such a response seems to be coming already, even in the past year because of the spike in oil prices.

We may be in a position to have all three magic pieces: scientific consensus, broad public understanding, and relatively low cost scenario solutions. Low cost doesn't mean under $100 or $200 or $300 billion a year by mid-century, but what it does mean is less than 1% of GNP to handle what otherwise would be an explosively growing problem.

As we –- Klaus Lackner and I, others at the Earth Institute, Bill Nordhaus who pioneered this many years ago -- try to look at scenarios beyond 2050, there will have to be new technologies added to this mix because those that I mentioned and a dozen more that I might have mentioned probably are not enough by themselves to overcome a continuing growing demand for primary energy sources

that would accompany what we would regard as successful global economic development prospects.

It is important to think about how, aside from what the U.S. and Europe will do, the big action over the next half century is going to be in the developing world, because that's where the big economic growth will be, we hope, and certainly should be normatively. There is a lot of pent up economic growth, some of which we see. We hope that a lot more of it gets unleashed. But there surely is significant rising demand for energy throughout Asia, and we hope throughout Africa and Latin America. Combining that with population growth is the predicate to my observation. We had better do something because the current path of inaction takes us to levels of carbon concentration that no scientist would find to be an acceptable risk, given what we know right now. Therefore, the idea of changing paths is based on a global scenario in which we hope that economic development takes hold.

If these things are approximately right: first that the risks of a business-as-usual course are very large, and second, that the politics may come into play what might we actually see develop?

First, we will move formally in discussions to the post Kyoto world, because that's already on the diplomatic agenda. From what I can see, China, India and some other major countries are ready to begin active participation in such discussions. That's absolutely vital because China will be the number one emitter in the world, most likely by the end of the first quarter century in 2025. I think the Chinese understand very well how serious an issue this is from all points of view for China's own climate, for China's own future, and for global security and geopolitics.

I sense a major change even in the last three or four years in the developing powers' approach to this issue. I think the situation of a few years ago, when they said, "Don't bother us. We're busy with development. You caused the problem. This is your fault. You solve it," which gave rise to the Annex I solution, are past. The numbers just don't add up. There is no way for the rich countries to solve this problem, because the developing countries are going to play such a large role quantitatively.

That does not mean that there is a consensus on how to do it and how to finance it, but it does mean that there will be very serious discussions globally that break out of this trap of Kyoto, and out of the trap – which the U.S. Congress has fixated on so much -- of excluding large parts of the world from the discussion.

In my view, the Chinese understand that the benefits of using coal cleanly and increasing fuel efficiency, from an economic and national security point of view, are high enough that they're going to want to do a lot about this problem.

There is going to be a strong need for the co-benefits of carbon management to move towards new generation technologies in coal in China, to have IGCC, to think about how to do carbon capture and sequestration, to have high efficiency automobiles in use because China is about to have the biggest boom in new cars in world history. China is presently on the cusp of an absolutely astounding expansion of ten million or more vehicles per year, and possibly even higher.

The Chinese I speak to are concerned about energy security and fuel efficiency. They're also investing massively in coal to liquid technologies now, and probably more than $1 billion of investments in Fisher-Tropsch processes for conversion of their coal into gasoline as part of a basic energy strategy is underway. That forces them to look even more deeply at how coal can be used effectively, in terms of pollution in their cities and carbon emissions.

In the end, there are likely to be some agreements that can be reached in the next few years centered on at least two sectors. The first is the automotive sector here and in other countries to make a massive move to increased automobile energy efficiency. I think this will find support in the United States based on some kind of deal with the auto makers and the auto unions for subsidizing a significant part of this transition. But the risks to Detroit of holding back any longer and not being able to sell cars in the rest of the world I think is becoming apparent, and there will be some kind of deal in the auto sector.

Secondly, I think that we could probably find some way to reach an agreement by which all new power plants above a certain scale are going to be clean, or carbon managed in one way or another. Different countries will choose to do carbon management in different ways. But the idea of rolling out a step by step transformation of the electricity sector in which retrofitting is not the objective, but new plants are built from a carbon management point of view, is feasible.

I thought until recently that this would require transfers from the U.S. to China, for example, to help pay for the plants. That is probably incorrect. It will likely require some technology transfer from the developed countries, but they will not have to bear much of the incremental costs of this kind of clean energy because the co-benefits of using coal cleanly will be very large and a major driver for China. The situation in India is less clear. These issues are not on the political horizon as much as they are in China, but I think they will be soon. I would guess that we'll find some way to reach such an agreement about Indian coal and Indian power plants as well.

All of that is predicated on carbon capture being feasible. If it is not feasible, it is unclear what is going to happen, because it seems likely that China and India are going to use their coal for development. If there is no way to use the coal safely, I think we are not going to have a safe trajectory. That would take away the third item I mentioned earlier: a reasonable low cost technological

solution. I do not expect and I cannot see how to advocate that China and India would give up any significant economic growth to reduce $CO_2$ emissions, but the technology seems to suggest that that will probably not be necessary. That is why I think that there is a good chance that a low cost solution will be found.

I would expect to see movement first in the automotive sector and the power sector, plus other large fossil fuel plants where carbon capture and sequestration technologies are feasible, such as steel, cement, refineries, ammonia production, hydrogen production plants, and a few other large sectors where the technology is easily applied.

According to even the best estimates, we are already committed to a world of significant climate change, whether we like it or not. Much of it is going to be extremely damaging, and it's likely that we are already seeing a lot of that damage, although that hasn't yet been proven. There are millions of people in dire hunger or starvation in Africa this year because of drought conditions interacting with other fragilities of the physical environment. I think we will look back on that situation and say it is quite likely the result of the climate change that is already occurring.

We have not yet taken a single step on the adaptation side. All of the focus has been on the mitigation side. Perhaps that is understandable. It is understandable first because we had to get a handle on whether or not there is a way to head the process off. Second, perhaps we have a greater understanding of mitigation than we do of adaptation, and that will be the case until attribution can really be accomplished. Doing so requires significant downscaling of very imprecise global models to tell us something about regional impacts, which means that it is very difficult to make any kind of attributions right now.

The fact of the matter, however, is that there is probably significant climate change already underway. We almost certainly have significant climate change committed, another .6 percent, 6 degrees centigrade, according to the ... I'd say the consensus mid-range estimate of what's already committed to come from the future but hasn't occurred yet because of thermal inertia. Yet we haven't taken any steps politically to address the needs of the poor, who are getting hammered by all of this.

Nor have we taken any steps to address the needs of the rich who are getting hammered by this, or the needs of the poor living in rich countries, which may be the real lesson of Katrina. We certainly haven't taken any steps for the poorest of the poor in the world who are likely to be enormously vulnerable to these changes.

Some economists have asked –- wrongly, in my view -- why we spend so much money on mitigating climate change when a much smaller amount spent on adaptation would be effective. That view is mistaken because the risks of climate

change are so large that it would be reckless to believe we could address them only through adaptation. But we don't spend money on either right now. We are not spending money on mitigation yet, although I've argued why we will. We certainly have not spent a meaningful penny yet on adaptation, and I would regard that as the greatest gap in the policy discussion and the policy agenda until now.